Claims 1, 5-17, 19-32 and 34-58 are pending in this case, Claims 2-4, 18 and 23 having been cancelled, and Claims 1, 5-12, 14-17, 19-28, 30-32, 34-43, 45-54 and 56-58 amended by the present amendment.

In the outstanding Office Action, the title was objected to; the drawings were objected to; Claims 9 and 16 were rejected under 35 U.S.C. § 112, first paragraph; Claims 2-4 and 17-58 were rejected under 35 U.S.C. § 112, second paragraph; Claims 1, 5-8, 13, 14, 17, 21-24, 29, 30, 32, 36-39 and 44 were rejected under 35 U.S.C. § 102(b) as anticipated by Nonoyama et al (US 5,646,924); Claims 2-4, 18-20 and 33-35 were rejected under 35 U.S.C. § 103(a) as unpatentable over the references applied to Claim 1 in view of Novotny et al (US 6,069,853); Claims 45-50, 55 and 56 were rejected under 35 U.S.C. § 103(a) as unpatentable over Novotny et al with Nonoyama et al; Claims 9, 25, 40 and 51 were rejected under 35 U.S.C. § 103(a) as unpatentable over the references applied to Claims 1, 17, 32 and 45 in view of Yoshinari et al (US 6,042,921); Claims 10, 26, 41 and 52 were rejected under 35 U.S.C. § 103(a) as unpatentable over the references applied to Claims 1, 17, 32 and 45 in view of Okubo (US 6,203,877 B1); Claims 11, 12, 27, 28, 42, 43, 53 and 54 were rejected under 35 U.S.C. § 103(a) as unpatentable over the references applied to Claims 1, 17, 32 and 45 in view of Kikuchi et al (US 4,711,821); Claims 15 and 57 were rejected under 35 U.S.C. § 103(a) as unpatentable over the references applied to Claims 1 and 45 and in view of either Takeuchi et al (US 5,272,684) or Novotny et al; and Claims 16, 31 and 58 were rejected under 35 U.S.C. § 103(a) as unpatentable over the references applied to Claims 1, 17 and 45 in view of the official notice.

In order to expedite examination, Claims 2-4, 18 and 33 were cancelled and Claims 1, 5-12, 14-17, 19-28, 30-32, 34-43, 45-54 and 56-58 were amended to further define Applicants' invention. No new matter has been added.

In response to the objection of the title, the title has been amended to be more descriptive of the invention. No new matter has been added.

In response to the objection to the drawings, Applicants consider that the features recited in Claims 9, 11 and 12 do not require a drawing for the understanding of the subject matter sought to be patented, conform to 37 C.F.R. 1.81(a).

Responding to the rejection of Claims 9 and 16 under 35 U.S.C. §112, first paragraph, Applicants note that the subject matter of Claims 9 and 16 was described in the specification at page 26, line 2 to page 27, line 2 and page 27, lines 3-14, respectfully. Therefore, it is respectfully submitted that the rejection of Claims 9 and 16 is traversed.

Regarding the rejection of Claims 2-4 and 17-58 under 35 U.S.C. §112, second paragraph, Claims 2-4, 18 and 33 have been cancelled and Claims 17, 19-28, 30-32, 34-43, 45-54 and 56-58 have been amended to recite "transparent heat radiating layer" as suggested in the outstanding Office Action. In view of this action, it is believed that Claims 17-58 particularly point out and distinctly claim the subject matter. None of the changes are believed to raise an issue of new matter.

Briefly recapitulating, amended Claim 1 is directed to an optical recording medium having a substrate, a recording layer formed on the substrate and having a first index of refraction, a first protective layer formed on the recording layer and having a second index of refraction, and a transparent heat radiating layer having a third index of refraction, formed on the first protective layer so as to disperse a heat from the recording layer. The indexes of

refraction of the layers described above are chosen such that the recording layer has the higher index of refraction. In Figure 6 for example, are shown a substrate 61, a recording layer 64, a first protective layer 65 and a transparent heat radiating layer 66.

Nonoyama et al disclose in Figure 1 a recording medium having a substrate 2, a recording layer 4, an upper heat resisting protective layer 5 and a reflective heat radiating layer 6. Applicants note that Nonoyama et al disclose at column 5, lines 11-32, a wide array of chemical structures for the recording layer used in the recording medium, so that is not possible to calculate/estimate an index of refraction for the recording layer 4. Therefore, a feature of having the recording layer with a higher index of refraction than the upper heat resisting protective layer 5 and the reflective heat radiating layer 6, as claimed by Applicants in amended Claim 1, cannot be attributed to Nonoyama et al's recording medium. In view of this diferrence, the rejection of Claim 1 based on Nonoyama et al is respectfully traversed. Claims 5-8, 13, 14, 17, 21-24, 29, 30, 32, 36-39 and 44 include limitations similar to those already discussed in relation to Claim 1. Therefore, the rejection of Claims 5-8, 13, 14, 17, 21-24, 29, 30, 32, 36-39 and 44 as anticipated by Nonoyama et al is respectfully traversed for the same reason above noted in regard to Claim 1.

Turning now to Novotny et al reference, Novotny et al disclose a device for retrieving data from or writing data to a storage medium that includes a heating element to reduce signal distortion in a data storage system.[1] Novotny et al address the problem of a head of a data storage system and in particular, a heated head that can be optical or magnetic. No reference is made in Novotny et al's disclosure about a chemical composition of the various layers that form the recording medium and therefore, a feature of having the recording layer with a

[1]Novotny et al, Abstract, lines 1-3.

higher index of refraction than the layers forming the recording medium, as claimed by Applicants in amended Claim 1, cannot be attributed to Novotny et al's recording medium. In view of this difference, Applicants respectfully submit that Claim 1 patentably define over the work of Nonoyama et al in view of Novotny et al. Claims 19, 20, 34 and 35 include limitations similar to those already discussed in relation to Claim 1. Therefore, the rejection of Claims 19, 20, 34 and 35 as being unpatentable over the work of Nonoyama et al in view of Novotny et al is respectfully traversed for the same reason above noted in regard to Claim 1.

Regarding the rejection of Claims 45-50, 55, and 56, independent Claim 45 has been amended to recite limitations similar to those already discussed in relation to Claim 1. Therefore, the rejection of Claims 45-50, 55, and 56 as unpatentable over Nonoyama et al considered with Novotny et al is respectfully traversed for the same reason above noted in regard to Claim 1.

Turning now to applied Yoshinari et al reference, Yoshinari et al disclose a phase charge type optical recording medium having a substrate 2, a first dielectric layer 31, a recording layer 4, a second dielectric layer 32, and a reflective layer 5.[2] Yoshinari et al disclose

> no specific limitation is imposed on the composition of the recording layer[3]

making it difficult to estimate/calculate an index of refraction for the recording layer. Further, Yoshinari et al disclose in an embodiment a preferred chemical structure of the

[2]Yoshinari et al, Abstract, lines 1-7, and Figure 1.

[3]Id., column 12, lines 40-41.

recoding layer,[4] but the preferred chemical structure is so broad that an index of refraction of the recording medium still cannot be estimated. Therefore, a feature of having the recording layer with a higher index of refraction than the second dielectric layer 32 and the reflective layer 5, as claimed by Applicants in amended Claim 1, cannot be attributed to Yoshinari et al's recording medium. Further more, Yoshinari et al do not disclose a transparent heat radiating layer formed on the second dielectric layer 32 so as to disperse a heat from the recording layer.

In view of these differences, Claim 1 patentably distinguish over the references applied to Claims 1, 17, 32 and 45 in view of Yoshinari et al. Claims 9, 25, 40 and 51 include limitations similar to those already discussed in relation to Claim 1. Therefore, the rejection of Claims 9, 25, 40 and 51 as anticipated by the references applied to Claims 1, 17, 32 and 45 in view of Yoshinari et al is respectfully traversed for the same reason above noted in regard to Claim 1.

Okubo discloses a phase-changing optical disc including a substrate 11, a first dielectric layer 12, a second dielectric layer 13, a recording layer 14, a third dielectric layer 15, and a reflection layer 16, for example in Figure 1. Okubo fails to disclose that the reflection layer 16 has the functionality of a transparent heat radiating layer formed on the third dielectric layer 15 so as to disperse a heat from the recording layer 14, feature claimed by Applicants in amended Claim 1. Therefore, Claim 1 patentably distinguish over the references applied to Claims 1, 17, 32 and 45 in view of Okubo. Claims 10, 26, 41 and 52 include limitations similar to those already discussed in relation to Claim 1. Therefore, the rejection of Claims 10, 26, 41 and 52 as anticipated by the references applied to Claims 1, 17,

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[4]Id., column 12, lines 46-59.

32 and 45 in view of Okubo is respectfully traversed for the same reason above noted in regard to Claim 1.

Regarding the rejection of Claims 11, 12, 27, 28, 42, 43, 53 and 54 as unpatentable over the references applied to Claims 1, 17, 32 and 45 in view of Kikuchi et al, Applicants respectfully traverse the rejection for the following reason. Kikuchi et al disclose a recording medium having a transparent plastic substrate 1a and 1b, a magnetic recording layer 2, two or more thin film layers 3a and 3b provided between the plastic substrate and the magnetic recording layer, as shown for example in Figures 1 and 2. Kikuchi et al fail to disclose a transparent heat radiating layer formed on the two or more thin films layers 3a and 3b so as to disperse a heat from the recording layer.[5] Therefore, Claim 1 patentably distinguish over the references applied to Claims 1, 17, 32 and 45 in view of Kikuchi et al. Claims 11, 12, 27, 28, 42, 43, 53 and 54 include limitations similar to those already discussed in relation to Claim 1. Therefore, the rejection of Claims 11, 12, 27, 28, 42, 43, 53 and 54 as anticipated by the references applied to Claims 1, 17, 32 and 45 in view of Kikuchi et al is respectfully traversed for the same reason above noted in regard to Claim 1.

Takeuchi et al disclose methods and apparatuses for improving accuracy of recording and reproducing information onto and from a magnetic optical recording information medium.[6] Takeuchi et al disclose at col. 15, line 14-12 to col. 16, line 12, a recording information medium 11 having a dielectric layer 81, a glass substrate 2, a first magnetic layer 13 as a recording layer, a second magnetic layer 14 as an auxiliary layer for recording, a third magnetic layer 83 as a control layer, a fourth magnetic layer 84 as an initialization layer, and

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[5]Kikuchi et al, column 3, lines 3-6.

[6]Takeuchi et al, Abstract, lines 1-4.

a protective layer 82, for example in Figure 17. Takeuchi et al fail to disclose a transparent heat radiation layer formed on the second magnetic layer 14 so as to disperse heat from the recording layer 13, feature claimed by Applicants in amended Claim 1. Therefore, Claim 1 patentably distinguish over the references applied to Claims 1 and 45 in view of either Takeuchi et al or Novotny et al. Claims 15 and 57 include limitations similar to those already discussed in relation to Claim 1. Therefore, the rejection of Claims 15 and 57 as unpatentable over the references applied to Claims 1 and 45 in view of either Takeuchi et al or Novotny et al is respectfully traversed for the same reason above noted in regard to Claim 1.

The rejection of Claims, 16, 31 and 58 is respectfully traversed as the official notice does not make any reference to a transparent heat radiating layer formed on a protective layer so as to disperse a heat from the recording layer.

Accordingly, in view of the foregoing, the present application is believed to be in condition for formal allowance. An early and favorable action is hereby respectfully requested.

Respectfully submitted,

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IN THE TITLE

Please delete the title and insert therefor the following new title.

HEAT-DISSIPATING OPTICAL RECORDING MEDIUM AND OPTICAL RECORDING AND REPRODUCTION DEVICE

IN THE ABSTRACT

Please replace the paragraph beginning at line 1 with the following:

HEAT-DISSIPATING OPTICAL RECORDING MEDIUM AND OPTICAL RECORDING AND REPRODUCTION DEVICE

IN THE CLAIMS

Please cancel Claims 2-4, 18 and 33 without prejudice or disclaimer.

Please amend Claims 1, 5-12, 14-17, 19-28, 30-32, 34-43, 45-54 and 56-58 as follows.

1. (Amended) An optical recording medium comprising:

a substrate;

a recording layer having a first index of refraction, formed on the substrate;

a first protective layer having a second index of refraction, formed on the recording layer; and

a transparent heat radiating layer having a third index of refraction, formed on the first protective layer [for promoting dispersion of] so as to disperse heat from the recording layer, wherein the first index of refraction is higher than the second and third indexes of refraction and [light being exposed on] the recording layer is exposed to light via a side at which the transparent heat radiating layer is positioned to thereby perform recording and[/or] reproduction of information.

2. (Cancelled)

3. (Cancelled)

4. (Cancelled)

5. (Amended) An optical recording medium as set forth in claim 1, wherein the transparent heat radiating layer has a higher heat conductivity than the first protective layer.

6. (Amended) An optical recording medium as set forth in claim 5, wherein the transparent heat radiating layer has a heat conductivity of about 0.1 (W/cm·K) or more.

7. (Amended) An optical recording medium as set forth in claim 6, wherein the transparent heat radiating layer has a quenching coefficient, with respect to the light used for recording and reproducing, of less than about 0.1.

8. (Amended) An optical recording medium as set forth in claim 7, wherein the transparent heat radiating layer comprises at least one of BN, A1N, SiN, SiC, Ta_2O_5, and diamond-state carbon.

9. (Amended) An optical recording medium as set forth in claim 1, wherein the transparent heat radiating layer is a multi-layer film comprising a plurality of layers stacked

together, having substantially same optical constants and [having] different heat constants [stacked together].

10. (Amended) An optical recording medium as set forth in claim 1, further comprising [wherein] a layer reflecting light [and comprising] including metal or semimetal, wherein the layer reflecting light is formed between the substrate and the recording layer.

11. (Amended) An optical recording medium as set forth in claim 1, further comprising an antireflection layer formed on the transparent heat radiating layer.

12. (Amended) An optical recording medium as set forth in claim 1, further comprising an antireflection layer between the transparent heat radiating layer and the recording layer.

14. (Amended) An optical recording medium as set forth in claim 1, wherein the recording layer comprises a material undergoing a phase change and [changing in] a complex index of refraction [by] of the recording layer changes under said light.

15. (Amended) An optical recording medium as set forth in claim 1, wherein the recording layer comprises a material having [changing in] a magnetization state changeable under an action of [by using] said light into a polarized state [and enabling detection of the change as a change of a polarization state].

16. (Amended) An optical recording medium as set forth in claim 1, wherein the recording layer comprises an organic dye material [changing in] having a complex index of refraction that changes under [or shape by] said light with respect to a wavelength of the reproducing light.

17. (Amended) An optical recording and reproduction device comprising:

a light source[,];

an optical recording medium[,]; and

an optical system focusing light from the light source to the optical recording medium, wherein the optical recording medium comprises,

a substrate,

a recording layer having a first index of refraction, formed on the substrate,

a first protective layer having a second index of refraction, formed on the recording layer, and

a transparent heat radiating layer having a third index of refraction, formed on the first protective layer so as to disperse heat from the recording layer, wherein [light from the optical system is exposed to] the recording layer is exposed to the light via a side [with] at which the transparent heat radiating layer is formed to thereby perform [for] recording and reproducing of information, and the first index of refraction is higher than the second and third indexes of refraction [and said heat radiating layer promotes dispersion of heat from the recording layer].

18. (Cancelled)

19. (Amended) An optical recording and reproduction device as set forth in claim [18] 17, wherein a length [the space] between the transparent heat radiating layer and the optical system is about 200 nm or less.

20. (Amended) An optical recording [medium] and reproduction device as set forth in claim 19, wherein the optical system comprises a solid immersion lens [(SIL)].

21. (Amended) An optical recording and reproduction device as set forth in claim 21, wherein the transparent heat radiating layer has a higher heat conductivity than the first protective layer.

22. (Amended) An optical recording and reproduction device as set forth in claim 21, wherein the transparent heat radiating layer has a heat conductivity of about 0.1 (W/cm·K) or more.

23. (Amended) An optical recording and reproduction device as set forth in claim 22, wherein the transparent heat radiating layer has a quenching coefficient, with respect to the light used for recording and reproducing, of less than about 0.1.

24. (Amended) An optical recording and reproduction device as set forth in claim 23, wherein the transparent heat radiating layer comprises at least one of BN, AlN, SiN, SiC, Ta_2O_5, and diamond-state carbon.

25. (Amended) An optical recording and reproduction device as set forth in claim 17, wherein the transparent heat radiating layer is a multi-layer film comprising a plurality of layers stacked together, having substantially same optical constants and [having] different heat constants [stacked together].

26. (Amended) An optical recording and reproduction device as set forth in claim 17, comprising [wherein] a layer reflecting [the] light including [and comprising] metal or semimetal, wherein the layer reflecting light is formed between the substrate and the recording layer.

27. (Amended) An optical recording and reproduction device as set forth in claim 17, wherein said optical recording medium further comprises an antireflection layer on the transparent heat radiating layer.

28. (Amended) An optical recording and reproduction device as set forth in claim 17, wherein said optical recording medium further comprises an antireflection layer between the transparent heat radiating layer and the recording layer.

30. (Amended) An optical recording and reproduction device as set forth in claim 17, wherein the recording layer comprises a material having [changing in] a magnetization state changeable under [by using] said light into a polarized state [and enabling detection of the change as a change of a polarization state].

31. (Amended) An optical recording and reproduction device as set forth in claim 17, wherein the recording layer comprises an organic dye material [changing in] having a complex index of refraction [or shape by] that changes under said light with respect to a wavelength of the reproducing light.

32. (Amended) An optical recording and reproduction device comprising:

a light source[,];

an optical recording medium[,]; and

an optical system focusing light from the light source to the optical recording medium, wherein the optical recording medium comprises,

a substrate,

a phase change recording layer having a first index of refraction, formed on the substrate and [and comprised of] comprising a material undergoing a phase change [and changing in a complex index of refraction by] under said focusing of light,

a first protective layer having a second index of refraction, formed on the phase change recording layer, and

a transparent heat radiating layer having a third index or refraction, formed on the first protective layer so as to disperse heat from the phase change recoding layer, wherein the first index of refraction is higher than the second and third indexes of refraction, and [light from the optical system is exposed to] the phase change recording layer is exposed to light via a side at which [with] the transparent heat radiating layer is formed to thereby perform [for]

recording and reproducing of information[, and said heat radiating layer promotes dispersion of heat from the phase change recording layer].

33. (Cancelled)

34. (Amended) An optical recording and reproduction device as set forth in claim [33] 32, wherein a length [the space] between the transparent heat radiating layer and the optical system is about 200 nm or less.

35. (Amended) An optical recording medium as set forth in claim 34, wherein the optical system comprises a solid immersion lens [(SIL)].

36. (Amended) An optical recording and reproduction device as set forth in claim 32, wherein the transparent heat radiating layer has a higher heat conductivity than the first protective layer.

37. (Amended) An optical recording and reproduction device as set forth in claim 36, wherein the transparent heat radiating layer has a heat conductivity of about 0.1 (W/cm·K) or more.

38. (Amended) An optical recording and reproduction device as set forth in claim 37, wherein the transparent heat radiating layer has a quenching coefficient, with respect to the light used for recording and reproducing, of less than about 0.1.

39. (Amended) An optical recording and reproduction device as set forth in claim 38, wherein the transparent heat radiating layer comprises at least one of BN, A1N, SiN, SiC, Ta_2O_5, and diamond-state carbon.

40. (Amended) An optical recording and reproduction device as set forth in claim 32, wherein the transparent heat radiating layer is a multi-layer film comprising a plurality of layers stacked together, having substantially same optical constants and [having] different heat constants [stacked together].

41. (Amended) An optical recording and reproduction device as set forth in claim 32, [wherein] comprising a light reflecting layer including [comprising] metal or semimetal, wherein the light reflecting layer is formed between the substrate and the phase change recording layer.

42. (Amended) An optical recording and reproduction device as set forth in claim 32, wherein said optical recording medium further comprises an antireflection layer on the transparent heat radiating layer.

43. (Amended) An optical recording and reproduction device as set forth in claim 32, wherein said optical recording medium further comprises an antireflection layer between the transparent heat radiating layer and the recording layer.

45. (Amended) An optical recording and reproduction device comprising:

a light source[,];

an optical recording medium[,]; and

an optical system focusing light from the light source to the optical recording medium, wherein the optical recording medium comprises:

a substrate,

a recording layer having a first index of refraction, formed on the substrate,

a first protective layer having a second index of refraction, formed on the recording layer, and

a transparent heat radiating layer having a third index of refraction, formed on the first protective layer so as to disperse heat from the recording layer, wherein

the first index of refraction is higher than the second and third indexes of refraction, and the light is focused from the optical system comprising a near field with the numerical aperture [(NA)] more than 1 to the recording layer via a side [with] at which the transparent

heat radiating layer is formed for recording and reproducing information[, and said heat radiating layer promotes dispersion of heat from the recording layer].

46. (Amended) An optical recording medium as set forth in claim 45, wherein the optical system comprises a solid immersion lens [(SIL)].

47. (Amended) An optical recording and reproduction device as set forth in claim 45, wherein the transparent heat radiating layer has a higher heat conductivity than the first protective layer.

48. (Amended) An optical recording and reproduction device as set forth in claim 47, wherein the transparent heat radiating layer has a heat conductivity of about 0.1 (W/cm·K) or more.

49. (Amended) An optical recording and reproduction device as set forth in claim 48, wherein the transparent heat radiating layer has a quenching coefficient, with respect to the light used for recording and reproducing, of less than about 0.1.

50. (Amended) An optical recording and reproduction device as set forth in claim 49, wherein the transparent heat radiating layer comprises at least one of BN, A1N, SiN, SiC, Ta_2O_5, and diamond-state carbon.

51. (Amended) An optical recording and reproduction device as set forth in claim 45, wherein the transparent heat radiating layer is a multi-layer film comprising a plurality of layers stacked together, having substantially same optical constants and [having] different heat constants [stacked together].

52. (Amended) An optical recording and reproduction device as set forth in claim 45, [wherein] comprising a layer reflecting [the] light, [and comprising] including metal or semimetal, wherein the layer reflecting light is formed between the substrate and the recording layer.

53. (Amended) An optical recording and reproduction device as set forth in claim 45, wherein said optical recording medium further comprises an antireflection layer on the transparent heat radiating layer.

54. (Amended) An optical recording and reproduction device as set forth in claim 45, wherein said optical recording medium further comprises an antireflection layer between the transparent heat radiating layer and the recording layer.

56. (Amended) An optical recording and reproduction device as set forth in claim 45, wherein the recording layer comprises a material undergoing a phase change and [changing in] a complex index of refraction [by] of the material changes under said light.

57. (Amended) An optical recording and reproduction device as set forth in claim 45, wherein the recording layer comprises a material having [changing in] a magnetization state changeable under the action of [by using] said light into a polarized state [and enabling detection of the change as a change of a polarization state].

58. (Amended) An optical recording and reproduction device as set forth in claim 45, wherein the recording layer comprises an organic dye material [changing in a complex index of refraction or shape by said light with respect to a wavelength of the reproducing light].--